

FIG. 1A

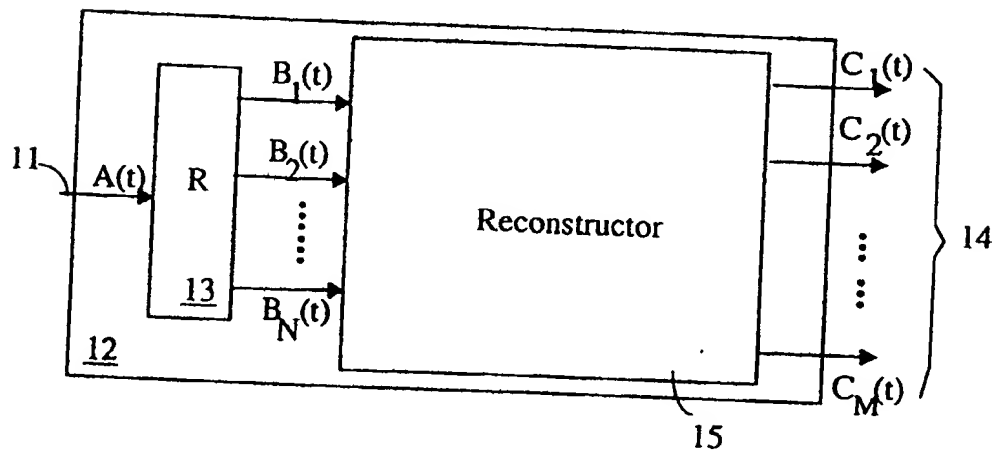


FIG. 1B

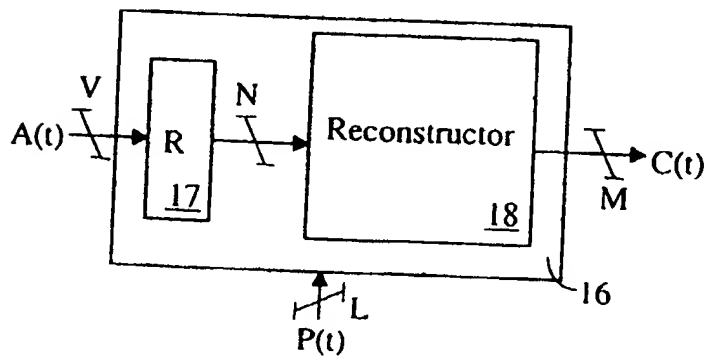
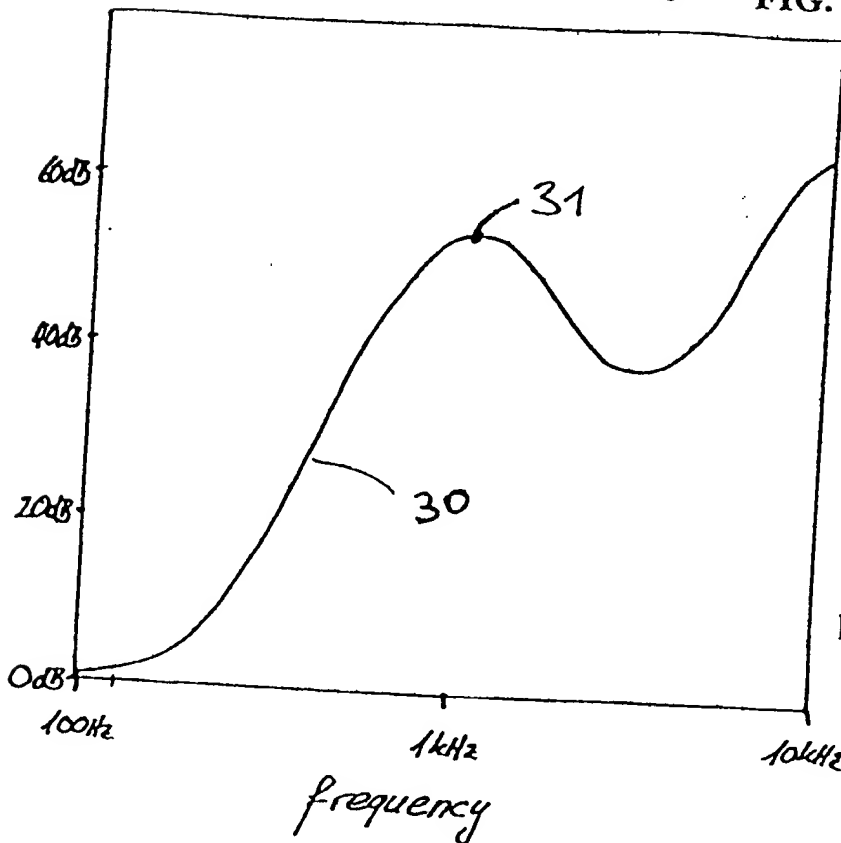
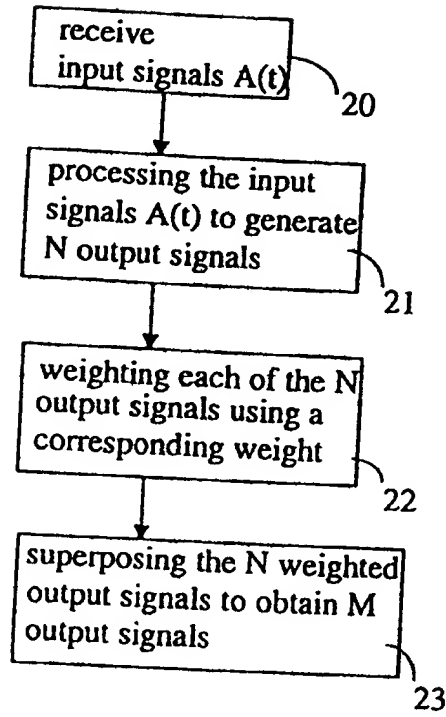


FIG. 1C

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FIG. 4

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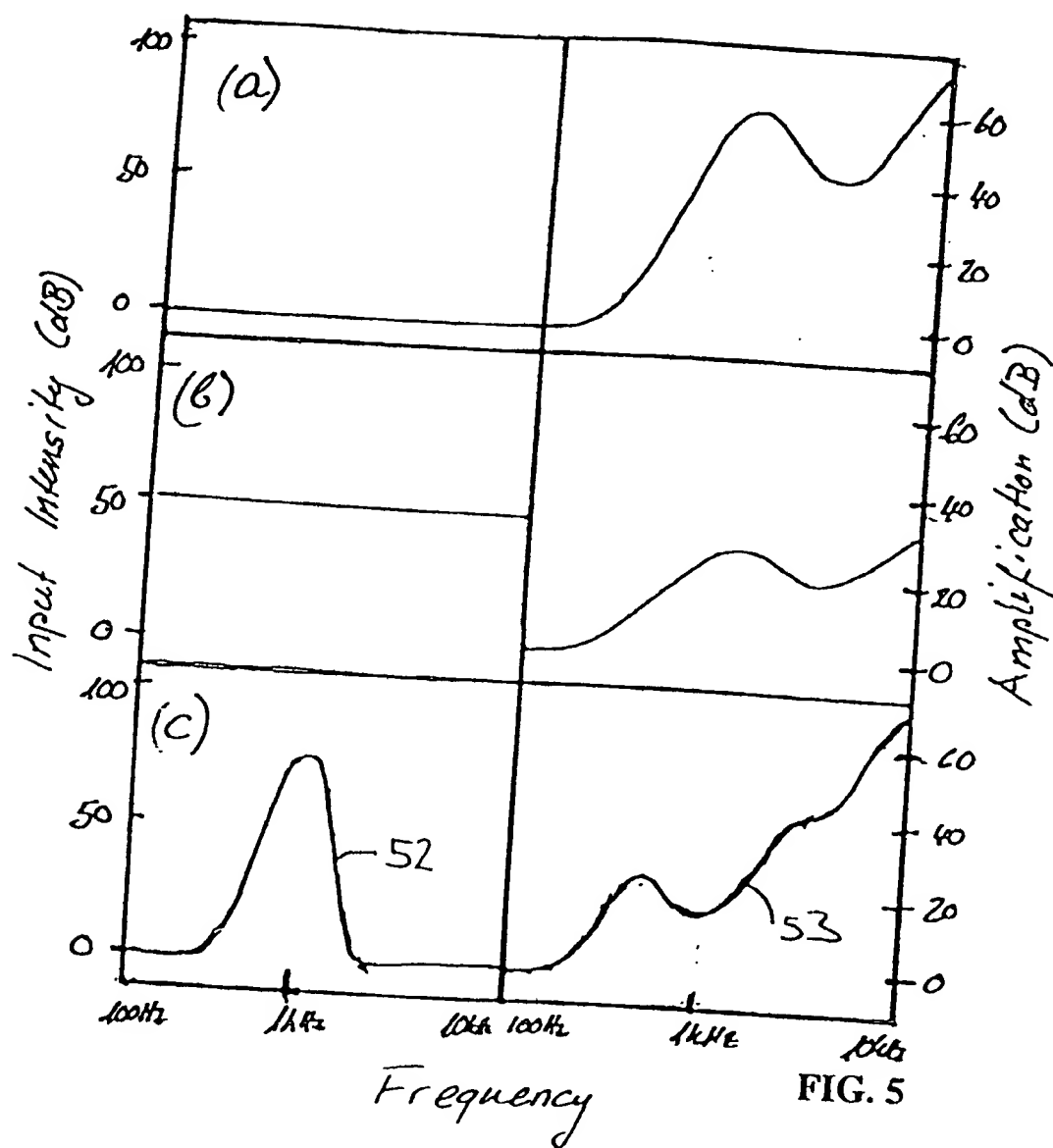


FIG. 5

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FIG. 6

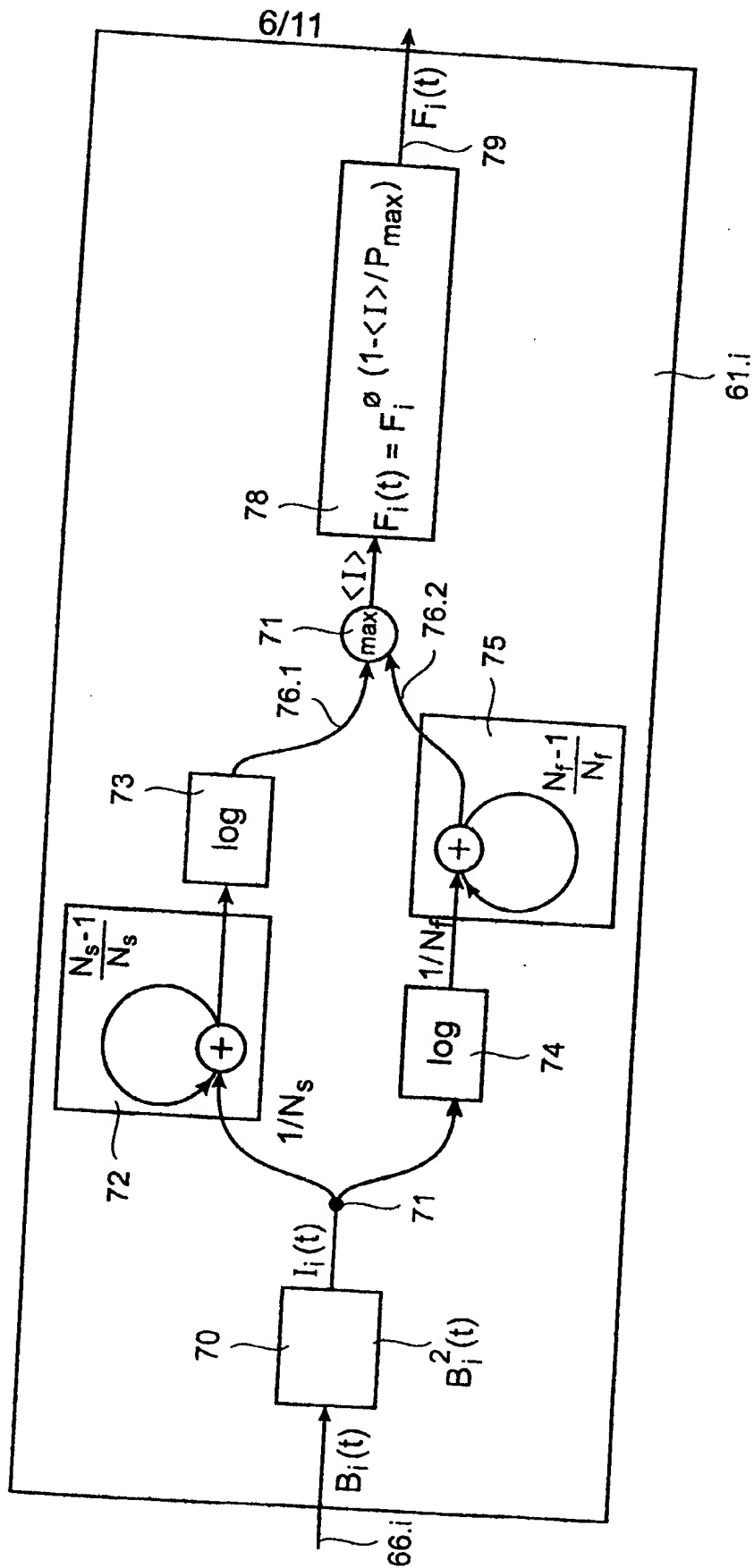


Fig. 7

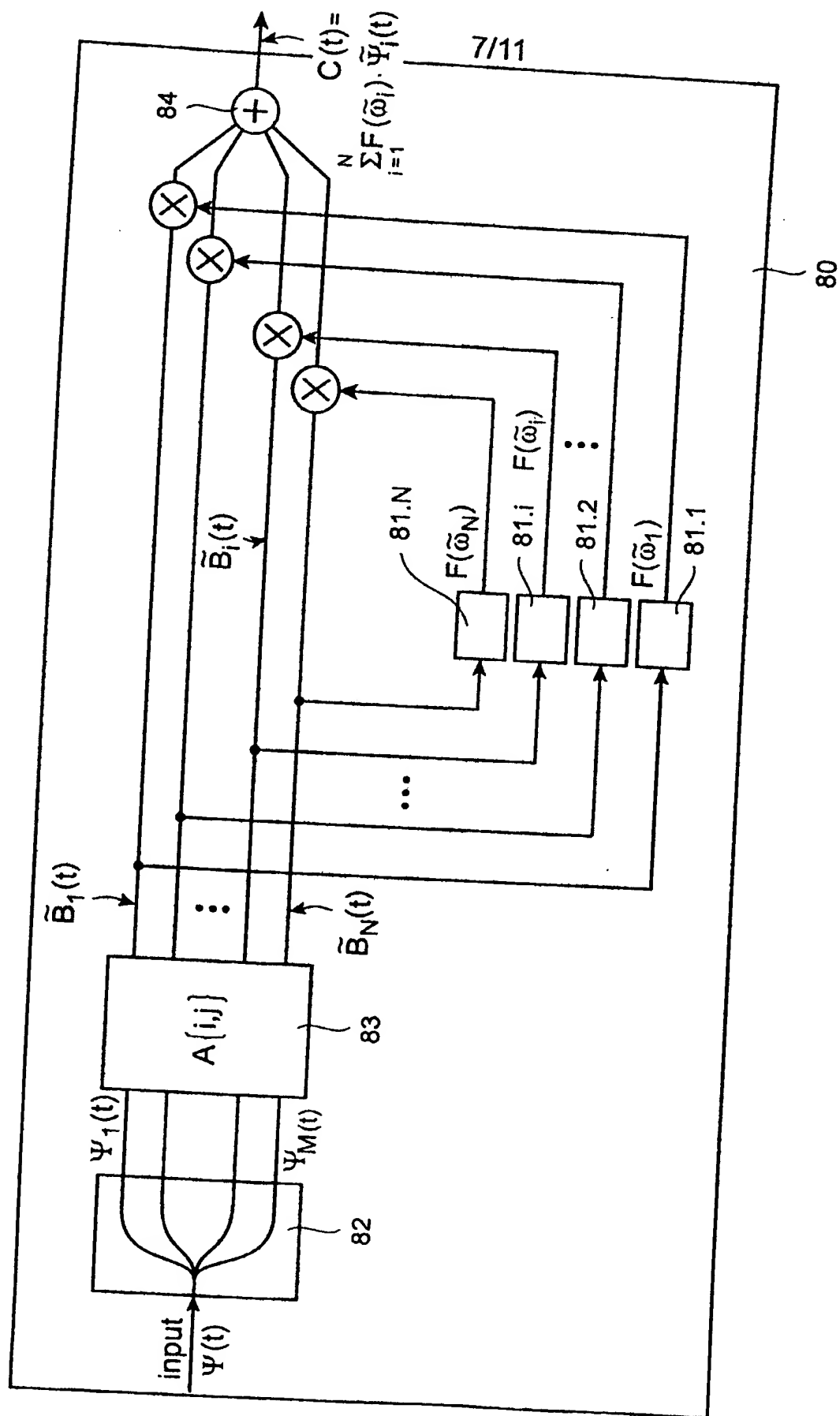


Fig. 8

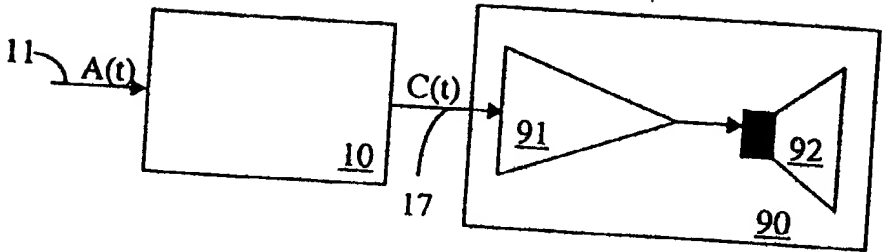


FIG. 9

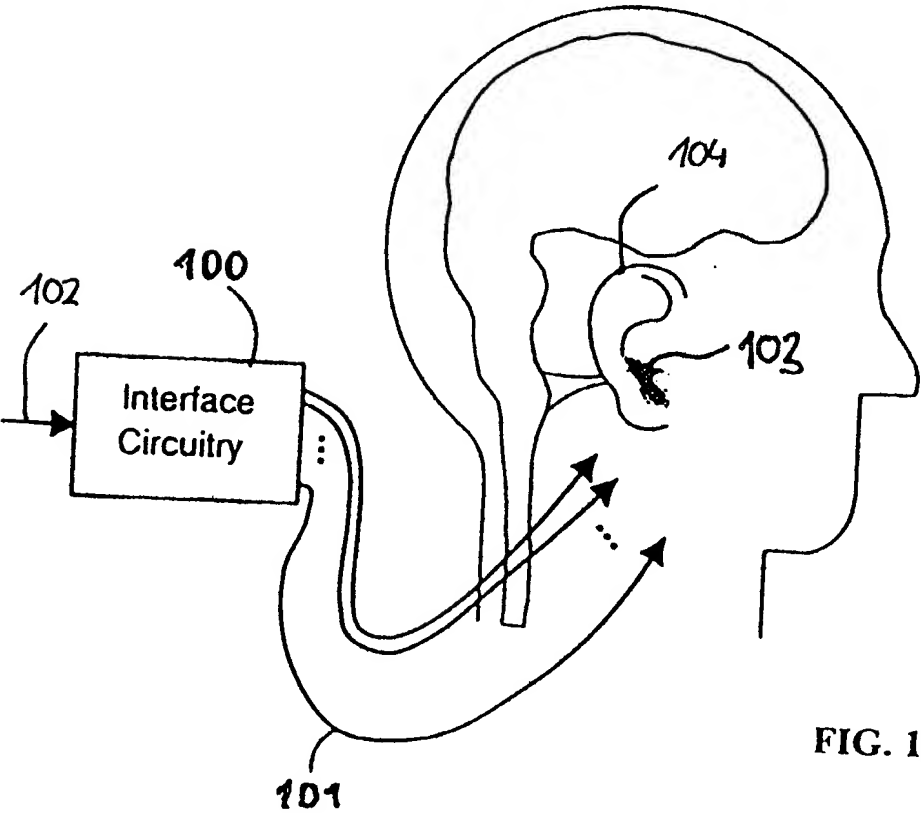


FIG. 10

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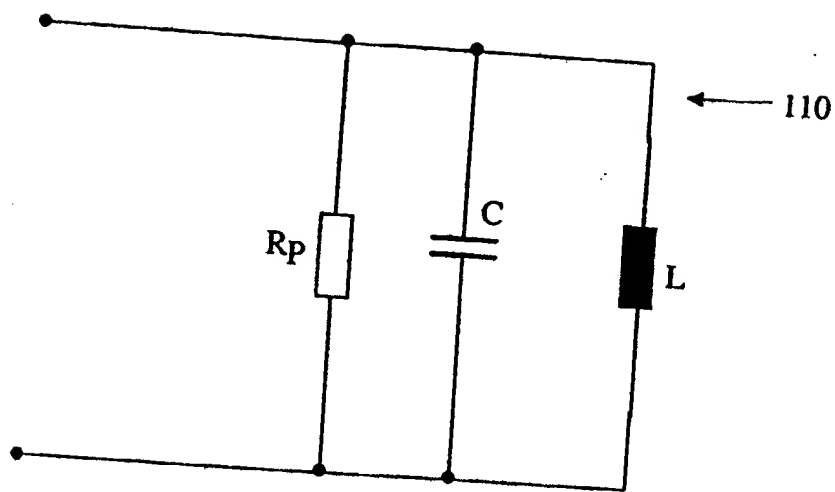


FIG. 11

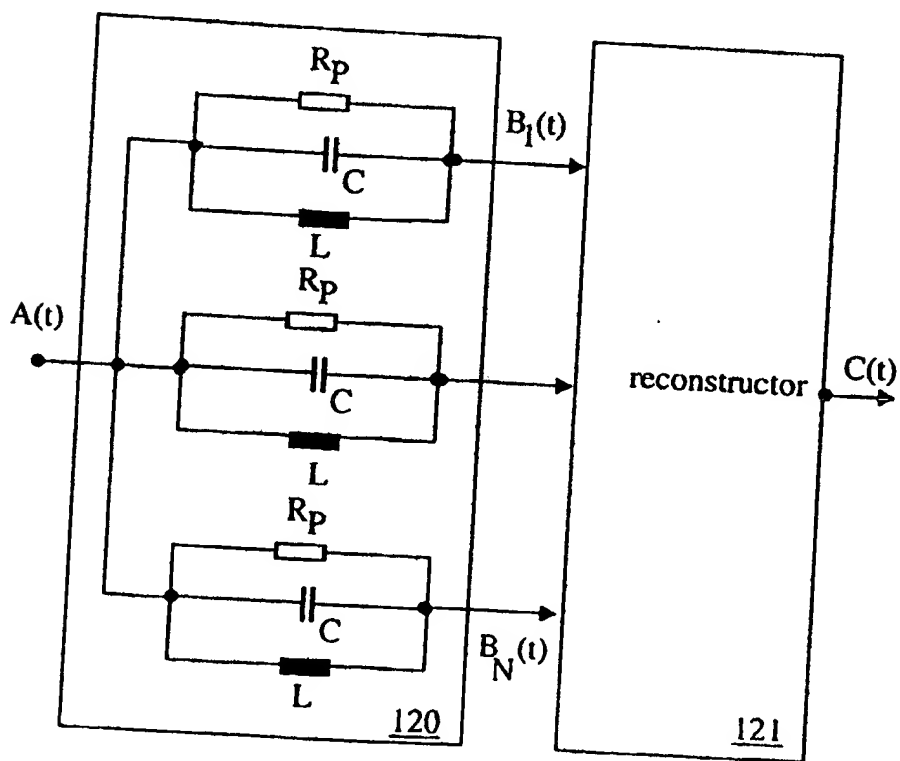


FIG. 12

FIG. 13A

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=====
Documentation example:
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```

get dt

```

130  for each N
                                [loop over resonators]

```

$$u_0(N) = (2 - (\omega(N)dt)^2) / (1 + dt/\tau(N))$$

[one example of equations describing
a damped harmonic resonator]

$$u_n(N) = -(1 - dt/\tau(N)) / (1 + dt/\tau(N))$$

$u_a(N) = -(1 - dt/\tau(N)) / (1 + dt/\tau(N))$ [a damped harmonic
 $u_i(N) = dt / (1 + dt/\tau(N)) / \tau(N)$

[u are constants]

$$\text{bm}(N) = 0$$
$$b_0(N) = 0$$

[b are amplitudes of resonators]
[bm is amplitude of previous time step]
[bo is amplitude of actual time step]

```

131 done with loop over N

```

```
[loop over time steps]
```

132 for each t

input a_p

```
[read input signal a of the]
[next time step]
```

```
if (first t) then
```

```
[the first time, reset stack]
[for input; otherwise a would]
[not be defined]
```

135 $a_0 = a_p$

$$a_m = a_p$$

end if

```
[calculate difference aprime of input signal a]
```

$$\text{aprime} = (a_p - a_m)$$

continue with FIG. 13B

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FIG. 13B

continuation of FIG. 13A

```

[propagate resonators; loop over all resonators]
  for each N
    134  $b_p = u_0(N) * b_0(N) + u_a(N) * b_a(N) + u_i(N) * a_{prime}$ 
        [resonator for following time]
        [step]
        [stack is updated/shifted]
     $b_a(N) = b_0(N)$ 
     $b_0(N) = b_p$ 
  done with loop over N

[at this point the weights weight(N) can be recalculated]
[as a function of the  $b_0(N)$ ]
[In this implementation example the weights are constant]
[weight and combine resonator output signals to generate]
[output signal c]
  c=0
  for each N
     $c = c + \text{weight}(N) * b_0(N)$ 
  done with loop over N

[reset stack for input]
   $a_a = a_0$ 
   $a_0 = a_p$ 

[output output signal c]
  output c

133 done with loop over t

end.
=====

```

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